

# **machine vision and colour**

nature, art, and fashion

Elizabeth Skipp

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# machine vision and colour

nature, art, and fashion

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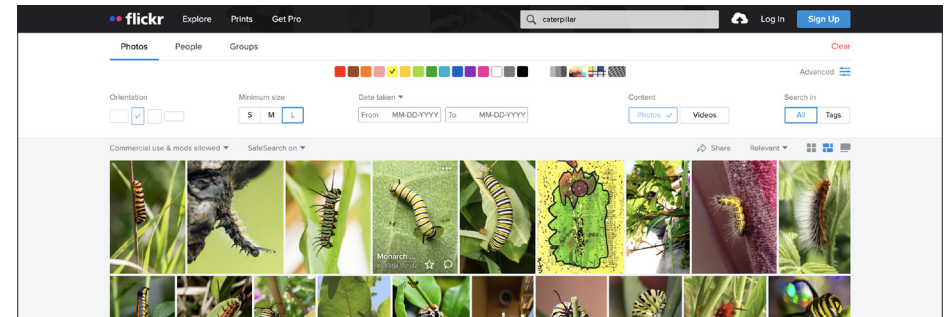
## **introduction**

Machine vision is a term for the way computers now can 'see' an image, and recognise its properties, or objects within it.

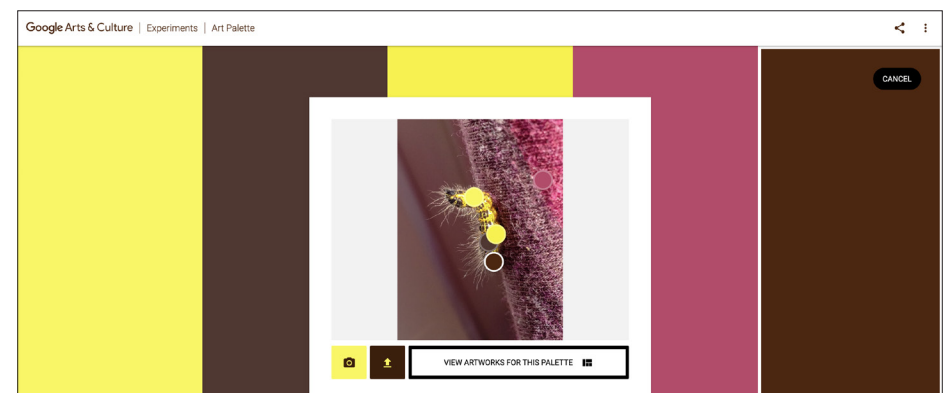
This eBook has been populated through the use of Flickr, and Google Experiments' Art Palette and Runway Palette. The experiments use machine vision technology.



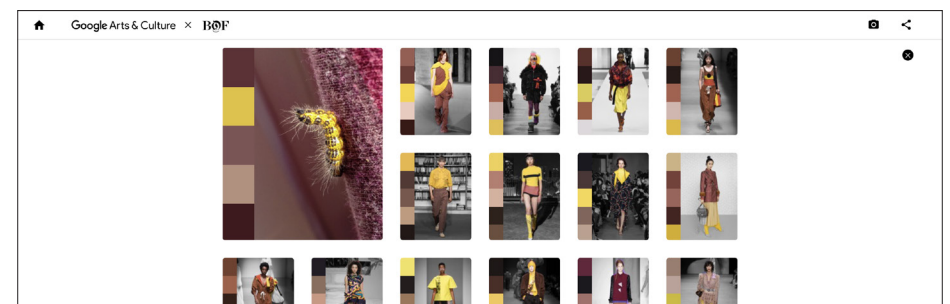
# the process



Flickr



Art Palette



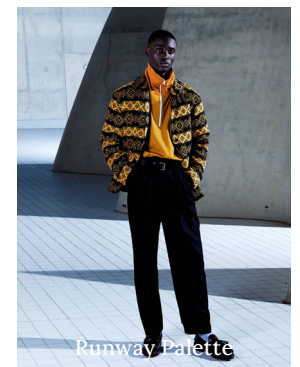
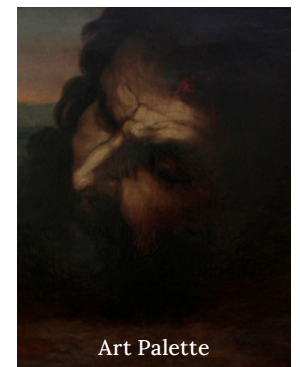
Runway Palette

Images from Flickr are taken into the two Google Experiments, and images are found using the machine's vision.

It's a simple exercise, and the difference in their detection of colour, and results, is interesting.

The Art Palette allows for a more direct selection of the subject's colour, and the Runway Palette takes the most common colours from the images, not allowing for alteration by the user.

The image results are then taken back into the other Google Experiment.



## blacks

Black is the darkest color, the result of the absence or complete absorption of visible light. It is an achromatic color, a color without hue, like white and gray.

It is often used symbolically or figuratively to represent darkness.

Black and white have often been used to describe opposites such as good and evil, the Dark Ages versus Age of Enlightenment, and night versus day.

Since the Middle Ages, black has been the symbolic color of solemnity and authority, and for this reason is still commonly worn by judges and magistrates.

“Computer vision and machine learning have really started to take off, but for most people, the whole idea of what is a computer seeing when it’s looking at an image is relatively obscure.”

Mike Krieger





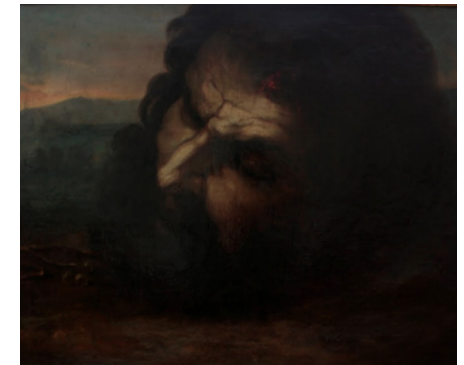
## Spiny caterpillar blue twig

Canon EOS 70D, EF100mm f/2.8L Macro IS USM  
f/14.0 100.0 mm 1/160 ISO 250 Flash (on, fired)



Coach

Fall/Winter 2018



Head of Goliath

Vieira Portuense 18th Century



Portrait of a Gentleman

Adriaen Hanneman Around  
1655



Vogue

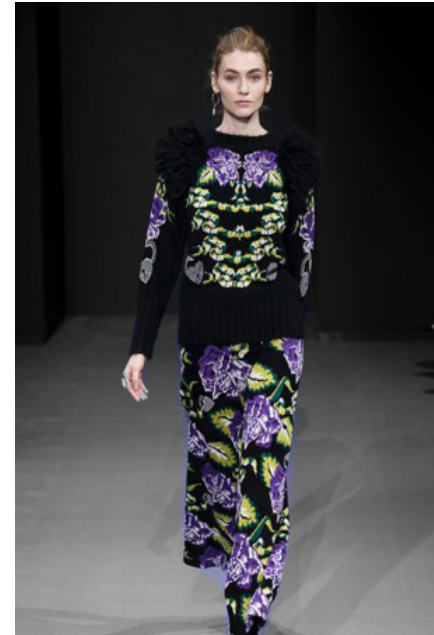
Fall 2018





**Tagpfauenauge raupen**

Pentax K-30  
f/2.8 100.0 mm 1/160 ISO 400 Flash (off, did not fire)



**Temperley London**  
Fall/Winter 2016



**Only her body-2**  
Kong Lingnan 2011



**Isabelle Ciaravola**  
Michel Lidvac 2009



**David Hart**  
Spring 2019

## blues

Blue is one of the three primary colours of pigments in painting and traditional colour theory, as well as in the RGB colour model.

It lies between violet and green on the spectrum of visible light. The eye perceives blue when observing light with a dominant wavelength between approximately 450 and 495 nanometres.

Most blues contain a slight mixture of other colours; azure contains some green, while ultramarine contains some violet.

The clear daytime sky and the deep sea appear blue because of an optical effect known as Rayleigh scattering.

“Machines of this character can  
behave in a very complicated  
manner when the number of units  
is large.”

Alan Turing





**Hairy caterpillar**

Nikon D7000  
f/2.8, f/18.0 105.0 mm 1/200 ISO 160 Flash (on, fired)



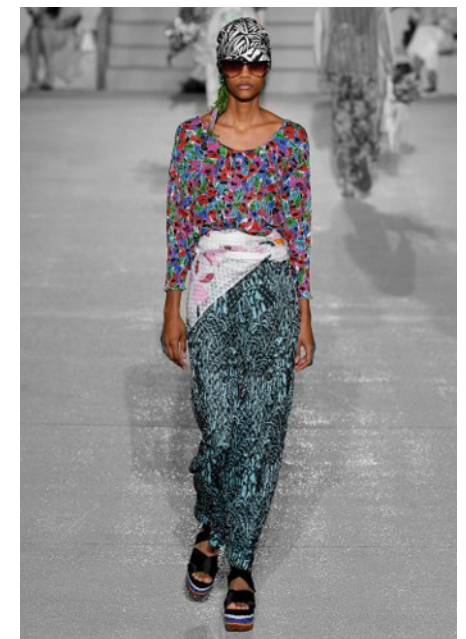
**CMMN SWDN**  
Autumn 2019



**Yamāntaka (black thangka)**  
Xi Hedao 2007



**Pendant with Head of Demon**  
Unknown 350



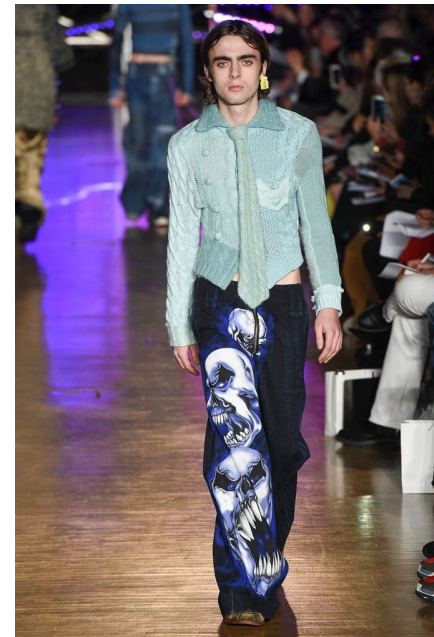
**Missoni**  
Spring 2020





**Arsenura caterpillar**

Panasonic DMC-TZ80  
f/4.4 11.7 mm 1/30 ISO 1600 Flash (off, did not fire)



**Central Saint Martins**  
Autumn 2019



**Untitled**  
1985



**#43**  
Cy Thao 1993/2001



**MAN**  
Spring 2019



## cyans

Cyan is a greenish-blue color. It is evoked by light with a predominant wavelength of between 490 and 520 nm, between the wavelengths of green and blue.

In the subtractive color system, or CMYK color model, which can be overlaid to produce all colors in paint and color printing, cyan is one of the primary colors, along with magenta, yellow, and black.

In the additive color system, or RGB color model, used to create all the colors on a computer or television display, cyan is made by mixing equal amounts of green and blue light.

Cyan is the complement of red; it can be made by the removal of red from white light. Mixing red light and cyan light at the right intensity will make white light.

“If we could build computers that could understand what’s in an image and could tell a blind person who otherwise couldn’t see that image, that would be pretty amazing as well.”

Mark Zuckerberg



**Actias neidhoederi**

Canon EOS 50D  
f/11.0 65.0 mm 1/250 ISO 100 Flash (on, fired)



**Discovered**  
Spring 2018



**Landscape with Pyramids**  
Federico Herrero 2014



**Red Door**  
Spiros Papalucas 1923



**Michael Kors**  
Spring 2017





**Promethia caterpillar**

Panasonic DMC-FZ200  
f/2.8 ISO 200 Flash (off, did not fire)



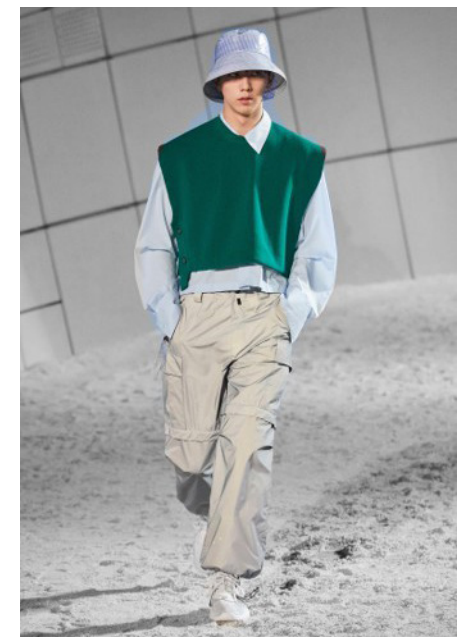
**Gucci**  
Spring 2018



**Almond Blossom**  
Vincent van Gogh 1890



**Night and Day**  
Josep M. Rosselló 2004



**Solid**  
Spring 2019

## greens

Green is the color between blue and yellow on the visible spectrum. It is evoked by light which has a dominant wavelength of roughly 495–570 nm.

In subtractive color systems, used in painting and color printing, it is created by a combination of yellow and blue, or yellow and cyan; in the RGB color model, used on television and computer screens, it is one of the additive primary colors, along with red and blue, which are mixed in different combinations to create all other colors.

By far the largest contributor to green in nature is chlorophyll, the chemical by which plants photosynthesize and convert sunlight into chemical energy. Many creatures have adapted to their green environments by taking on a green hue themselves as camouflage.

Several minerals have a green color, including the emerald, which is colored green by its chromium content.

“There is no reason and no way that  
a human mind can keep up with an  
artificial intelligence machine by  
2035.”

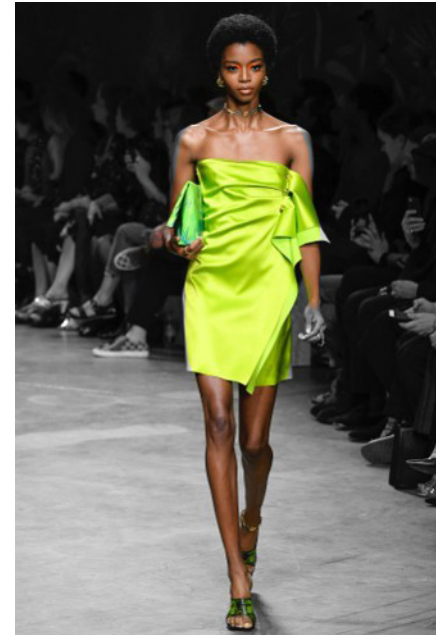
Gray Scott



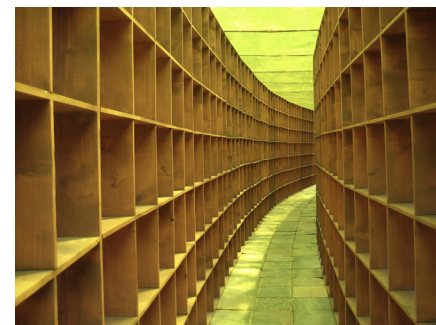


**Green caterpillar hypena**

Canon PowerShot SX40 HS  
f/8.0 38.8 mm 1/250 ISO 100 Flash (on, fired)



**Versace**  
Spring 2020



**Space of Memory  
(Supplemental)**



**Moved Landscape**  
Lim, Taek 2007



**Valentino**  
Spring 2019



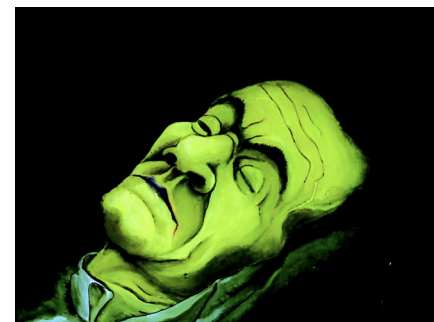


**Black swallowtail caterpillar**

HUAWEI CLT-L04  
f/1.8 4.0 mm 1/180 ISO 50 Flash (off, did not fire)



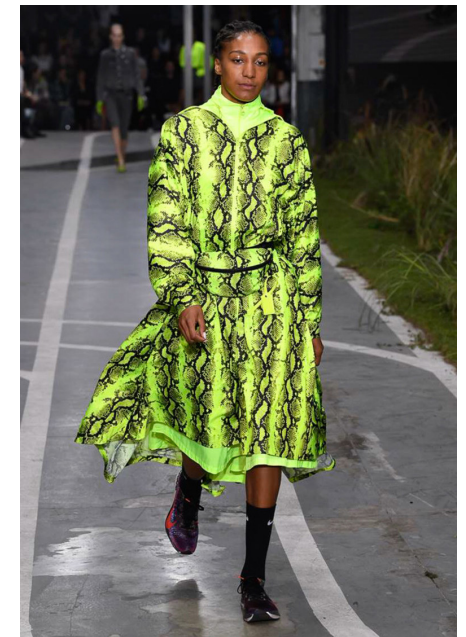
**Christopher John Rogers**  
Spring 2020



**At the End**  
Dragan Gaži 1966



**Desire (Supplemental)**



**Off-White**  
Spring 2019

## yellows

Yellow is the color between orange and green on the spectrum of visible light. It is evoked by light with a dominant wavelength of roughly 570–590 nm.

It is a primary color in subtractive color systems, used in painting or color printing. In the RGB color model, used to create colors on television and computer screens, yellow is a secondary color made by combining red and green at equal intensity.

Carotenoids give the characteristic yellow color to autumn leaves, corn, canaries, daffodils, and lemons, as well as egg yolks, buttercups, and bananas. They absorb light energy and protect plants from photodamage in some cases.

Sunlight has a slight yellowish hue when the Sun is near the horizon, due to atmospheric scattering of shorter wavelengths (green, blue, and violet).

“We are entering a new world. The technologies of machine learning, speech recognition, and natural language understanding are reaching a nexus of capability. The end result is that we’ll soon have artificially intelligent assistants to help us in every aspect of our lives.”

Amy Stapleton





**Caterpillar on a t-shirt**

Apple iPhone 5  
f/2.4 4.1 mm 1/540 ISO 50 Flash (off, did not fire)



**Rick Owens**  
Spring 2017



**Measure**  
Arsen Levonee 2014



**Maharana Ari Singh II**  
**Displaying His Prowess in**  
**Archery**  
Unknown c.1761-1762



**Sies Marjan**  
Autumn 2016





**Monarch caterpillar**

Canon PowerShot SX40 HS  
f/8.0 43.1 mm 1/250 ISO 200 Flash (on, fired)



**Koché**  
Pre-Fall 2018



**A church behind a poplar**  
Unknown Early 1950s–Late 1980s



**Portrait of Camille Roulin**  
Vincent van Gogh 1888



**Akira Naka**  
Cruise 2020

## orange

Orange is the colour between yellow and red on the spectrum of visible light.

Human eyes perceive orange when observing light with a dominant wavelength between roughly 585 and 620 nanometres.

In painting and traditional colour theory, it is a secondary colour of pigments, created by mixing yellow and red. In the RGB color model, it is a tertiary colour. It is named after the fruit of the same name.

The orange colour of carrots, pumpkins, sweet potatoes, oranges, and many other fruits and vegetables comes from carotenes, a type of photosynthetic pigment. These pigments convert the light energy that the plants absorb from the sun into chemical energy for the plants' growth. Similarly the hues of autumn leaves are from the same pigment after chlorophyll is removed.

“Machine learning and deep learning  
will create a new set of hot jobs in the  
next 5 years.”

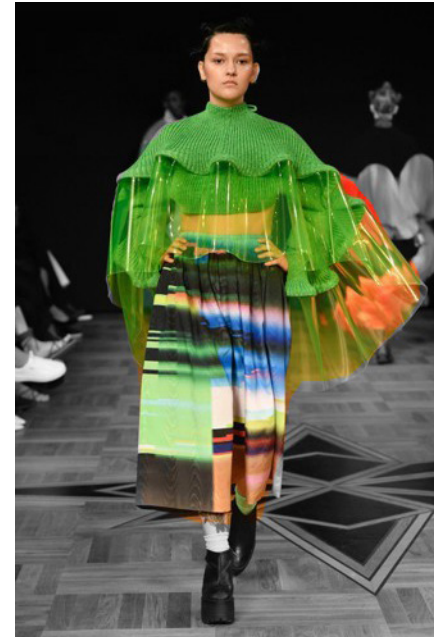
Dave Waters.



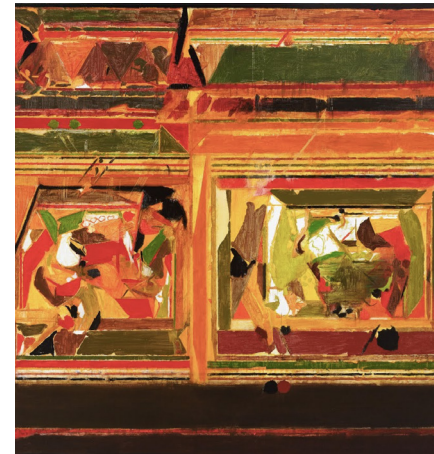


**Campylotes maculosa**

Nikon D200  
f/16.0 60.0 mm 1/180 ISO 100



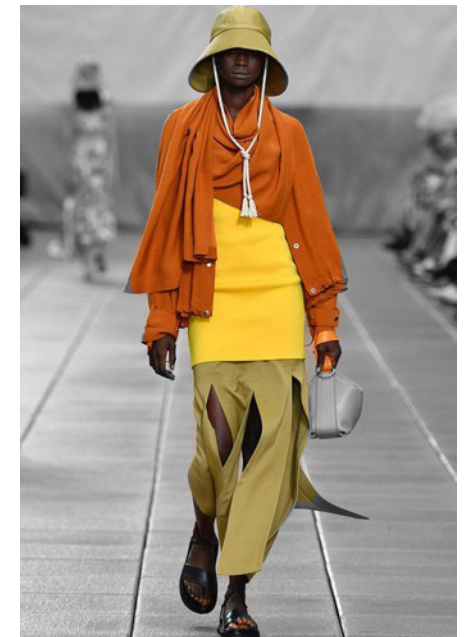
**Swedish School of Textiles**  
Spring 2019



**Rajasthan II**  
S. H. Raza 1983



**China Diary, No.54**  
Zhu Wei 2008



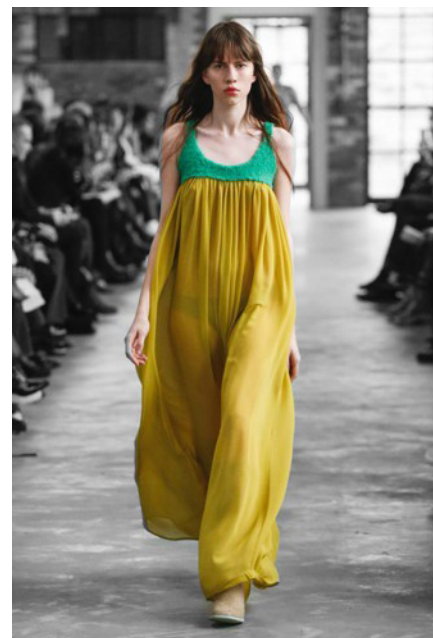
**Phillip Lim**  
Spring 2019





**Spotted fritillary caterpillar**

Panasonic DMC-LX5  
f/4.0 5.1 mm 1/800 ISO 80 Flash (off, did not fire)



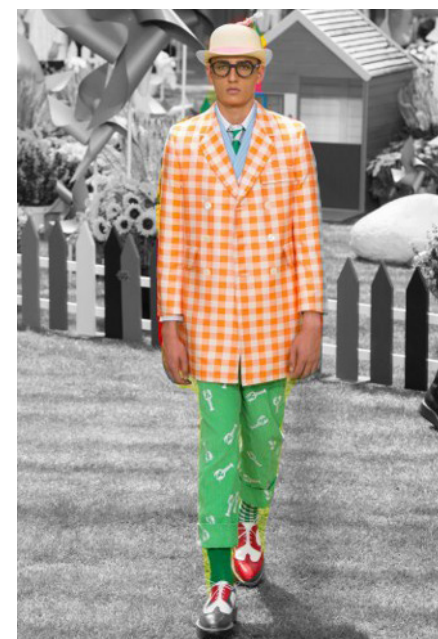
**Eckhaus Latta**  
Autumn 2018



**Garniture de trois**



**Vegetable Animal**  
Louise Guillaume 2004



**Thom Browne**  
Spring 2019

## **pink**

Pink is a pale tint of red that is named after a flower of the same name. It was first used as a color name in the late 17th century.

According to surveys in Europe and the United States, pink is the color most often associated with charm, politeness, sensitivity, tenderness, sweetness, childhood, femininity and romance.

A combination of pink and white is associated with chastity and innocence, whereas a combination of pink and black links to eroticism.

The color pink has been described in literature since ancient times. In the Odyssey, written in approximately 800 BCE, Homer wrote “Then, when the child of morning, rosy-fingered dawn appeared...” Roman poets also described the color.

Roseus is the Latin word meaning “rosy” or “pink.” Lucretius used the word to describe the dawn in his epic poem On the Nature of Things (De rerum natura).

**“Technology, through automation and artificial intelligence, is definitely one of the most disruptive sources.”**

Alain Dehaze





**Circoptes obtusata**

Nikon D80  
f/16.0 105.0 mm 1/100 ISO 250 Flash (auto, fired)



**Royal College of Art**  
Spring 2018



**The Hindu Goddess Durga**  
Unknown 17th century



**Decorated plate**  
Marc Schoelcher c. XIX century



**Karen Walker**  
Autumn 2019



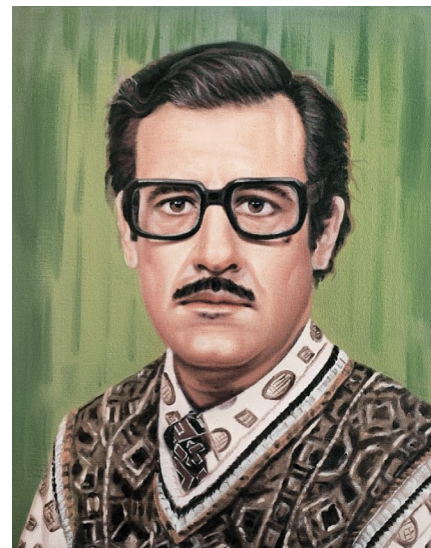


**Caterpillar**

Canon EOS 6D  
f/14.0 100.0 mm 1/160 ISO 1250 Flash (off, did not fire)



**Gmbh**  
Autumn 2018



**Unknown**



**Detail from Main Reredos at  
Sanctuario Church**  
Chimayo E Boyd 1935/1942



**Gig Couture**  
Spring 2017

## red

Red is the color at the end of the visible spectrum of light, next to orange and opposite violet. It has a dominant wavelength of approximately 625–740 nanometres. It is a primary color in the RGB color model and the CMYK color model, and is the complementary color of cyan. Reds range from the brilliant yellow-tinged scarlet and vermillion to bluish-red crimson, and vary in shade from the pale red pink to the dark red burgundy.

Red pigment made from ochre was one of the first colors used in prehistoric art. The Ancient Egyptians and Mayans colored their faces red in ceremonies; Roman generals had their bodies colored red to celebrate victories. It was also an important color in China, where it was used to color early pottery and later the gates and walls of palaces.

“The development of full artificial intelligence could spell the end of the human race... It would take off on its own, and re-design itself at an ever increasing rate. Humans, who are limited by slow biological evolution, couldn’t compete, and would be superseded.”

Stephen Hawking





**Pipevine swallowtail caterpillar**

Canon PowerShot SX40 HS  
f/8.0 8.9 mm 1/250 ISO 100 Flash (on, fired)



**Undercover**  
Spring 2017



**Untitled (Entanglement series)**  
Wanda Pimentel 1968



**Kids picking cranberries**  
Josip Generalić 1946–2004



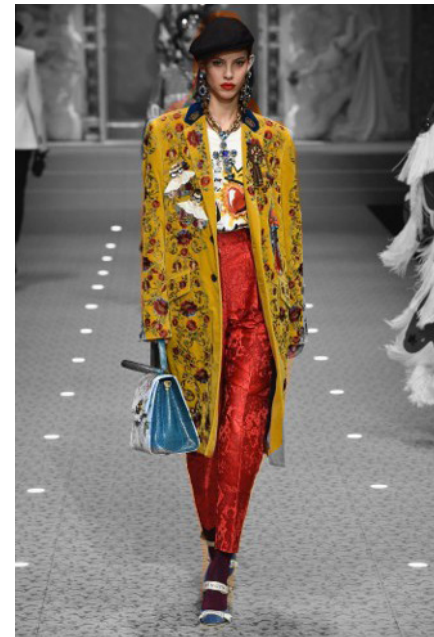
**Gucci**  
Autumn 2017



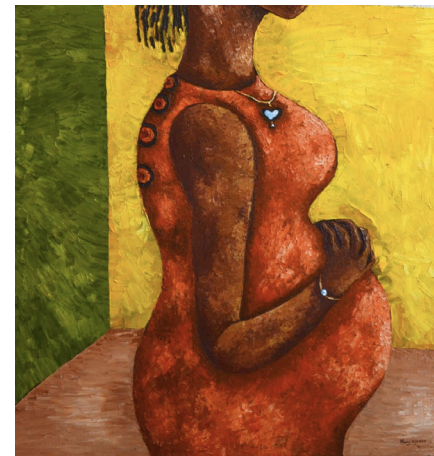


**Eumaeus atala**

Canon EOS Rebel T6i  
f/18.0 400.0 mm 1/200 ISO 400 Flash (on, fired)



**Dolce & Gabbana**  
Autumn 2018



**Almost Due**  
Mary Ogembo



**Apparel**  
Unknown c. 510



**Marques Almeida**  
Autumn 2016



brand Coach  
season Fall/Winter 2018



title Portrait of a Gentleman  
creator Adriaen Hanneman  
date created Around 1655  
subject Portrait  
size 645 x 765 cm  
type Painting  
medium Oil on canvas



title Head of Goliath  
creator Vieira Portuense  
date 18th Century  
size 625 x 495 mm  
provenance Fundação Dionísio Pinheiro e Alice Cardoso Pinheiro  
type Oil on canvas  
art genre Painting  
painter Vieira Portuense  
original title Cabeça de Golias



brand Vogue  
season Fall 2018  
look 5



brand Temperley London  
season Fall/Winter 2016



title Only her body-2  
creator Kong Lingnan  
date created 2011  
type Exhibition Scene



brand David Hart  
season Spring 2019





title Isabelle Ciaravola  
 creator Michel Lidvac  
 date 2009  
 provenance Michel Lidvac  
 type Photographie



brand CMMN SWDN  
 season Fall/Winter 2019



title Yamāntaka (black thangka)  
 creator Xi Hedao  
 date 2007  
 type Thangka  
 size 73 x 40 cm



title Pendant with Head of Demon  
 creator unknown  
 date -350  
 size 33mm (width)  
 type pendants  
 medium glass



brand Missoni  
 season Spring/Summer 2020



brand Central Saint Martins  
 season Fall/Winter 2019



title Untitled  
 date 1985  
 size 1680 x 1960 cm  
 type painting  
 technique Acrylic on canvas



title #43  
 creator Cy Thao  
 date 1993/2001  
 size 762 x 914 mm  
 type painting  
 medium oil on canvas



brand MAN  
 season Spring 2019



brand Discovered  
 season Spring 2018



title Landscape with Pyramids  
 creator Frederico Herrero  
 date 2014  
 size 165 x 150 cm  
 type Painting  
 medium Acrylic, oil, spray paint, and felt-tip pen on canvas



title Red Door  
 creator Spiros Papalucas  
 size 24 x 20 cm  
 date 1923  
 type Oil on cardboard

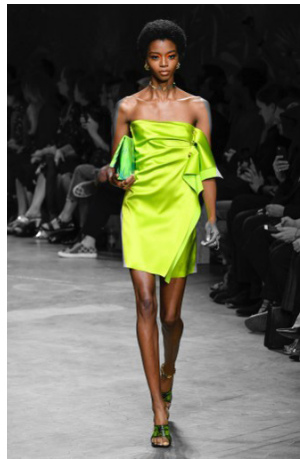




brand Michael Kors  
season Spring 2017



title Night and Day  
creator Josep M. Rosseló  
size 100 x 120 cm  
date 2004  
type Oil on wood



brand Versace  
season Spring 2020



brand Valentino  
season Spring 2019



title Desire (Supplemental)



title Measure  
creator Arsen Levonee  
size 60 x 80 cm  
date 2014  
type painting  
medium Oil on canvas



brand Gucci  
season Spring 2018



brand Solid  
season Spring 2019



title Space of Memory  
(Supplemental)



title Moved Landscape-  
Journey 075  
creator Taek Lim  
size 630 x 840 cm  
date 2007  
medium C-print



brand Christopher John  
Rogers  
season Spring 2020



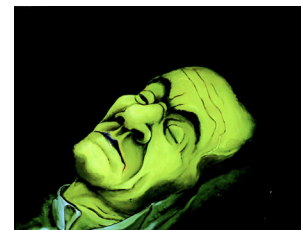
brand Off-White  
season Spring 2019



title Maharana Ari Sigh II  
creator unknown  
size 356 x 457 mm  
date circa 1761-62  
medium Opaque watercolour  
on gold paper



title Almond Blossom  
creator Vincent van Gogh  
date 1890  
type Oil on cardboard  
location created France



title At the End  
creator Dragan Gaži  
date 1966  
size 280 x 355 mm



brand Rick Owens  
season Spring 2017



brand Sies Marjan  
season Autumn 2016

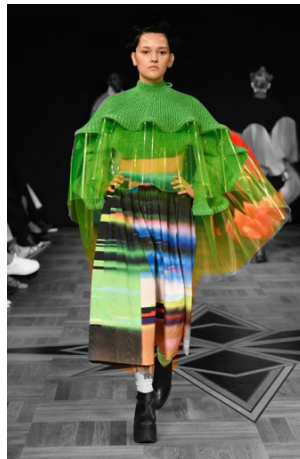




brand Koché  
season Pre-fall 2018



title Portrait of Camille Roulin  
creator Vincent van Gogh  
size 325 x 405 mm  
date 1888  
medium Oil on canvas



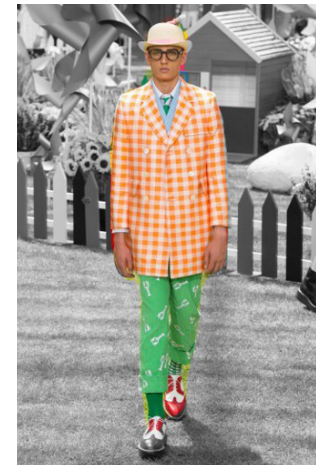
brand Swedish School of  
Textiles  
season Spring 2019



brand Philip Lim  
season Spring 2019



title Vegetable Animal  
creator Louise Guillaume  
date 2004



brand Thom Browne  
season Spring 2019



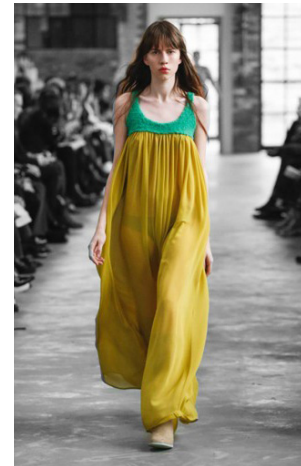
title A Church Behind a Poplar  
creator Unknown  
size 73 x 54 cm  
date 1950s-80s  
medium Drawing and  
watercolour



brand Akira Naka  
season Cruise 2020



title Rjasthan II  
creator S. H. Raza  
date 1983



brand Eckhaus Latta  
season Autumn 2018



title Garniture de Trois  
(Supplemental)  
creator Unknown



brand Royal College of Art  
season Spring 2018



title China Diary, No. 54  
creator Zhu Wei  
date 2008





**title** The Hindu Goddess  
**Durga**  
**creator** Unknown  
**date** Late 17th C.



**brand** GMBH  
**season** Autumn 2018



**brand** Gig Couture  
**season** Spring 2017



**title** Untitled. Entanglement  
**Series**  
**creator** Wanda Pimentel  
**date** 1968



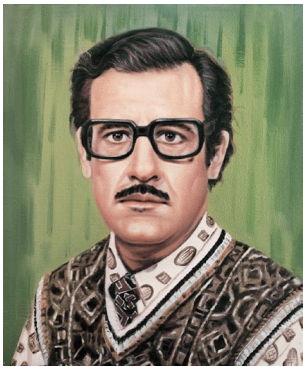
**brand** Dolce & Gabbana  
**season** Autumn 2018



**brand** Marques Almedia  
**season** Autumn 2016



**title** Decorated Plate  
**creator** Marc Schoelcher  
**date** Early 19th C.



**title** Untitled  
**creator** Unknown



**brand** Undercover  
**season** Spring 2017



**brand** Gucci  
**season** Autumn 2017



**title** Almost Due  
**creator** Mary Ogembo



**brand** Karen Walker  
**season** Autumn 2019



**title** Detail from Main Reredos  
**at Santuario Church**  
**creator** Chimayo E Boyd  
**date** 1935/42



**title** Kids Picking Canberrys  
**creator** Josip Generalić  
**date** 1946-2004



**title** Apparel  
**creator** Unknown  
**date** 1510



## **machine vision and colour**

nature, art, and fashion

Elizabeth Skipp

*University of Reading*